

Smallholders' fuelwood collection and forest management in Central Kenya

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The East African countries have institutionalised participatory forest management with a view to alleviating forest degradation. In Kenya, the new Forest Act came into effect in 2007 that stipulated for organization of community forest associations (CFAs), and empirical investigation shall be conducted into problems created and/or confronted by the introduction of the new system. This study looks into the case of South Laikipia Forest Reserve (North section) located in Central Kenya, and examines smallholders' fuelwood (firewood and charcoal wood) use with GIS, field measurement, and participant observation. The local users have not yet organised themselves into CFAs, and the authorities argue that participatory forest management is unrealistic because the already degraded resources do not give economic incentives for their participation. However, the forest reserve still has important resources, including coppice shoots of indigenous trees for fuelwood, and continues to be an indispensable element in smallholder livelihood security: its significance should not be underestimated, and it is waiting for detailed examination so as to substantiate participatory management for sustainable resource use.

In the study, first, land cover change was detected in and around the forest reserve over the period of 40 years applying the object-based image segmentation and classification technique to a co-registered image of aerial photograph and SPOT image, illustrating the substantial change from forest to bush-type vegetation. Second, the field observation focused on one of the indigenous tree species, *Euclea divinorum* (locally known as Mukinyei/Mukinyai), which have increased in the reserve after most taller trees were cut for timber use. The study selected this indigenous plant because it coppices vigorously after harvest and is easily identifiable for a resource use survey: other harvested species, which smallholders do not recognise as able to coppice regenerate, are impossible to locate in the case where they have been totally uprooted for fuelwood. A stratified single-stage cluster sampling was applied to 20 by 20 m plots constituting four distance zones that juxtaposed one another from the edge to the interior of the forest reserve, and all individual *Euclea divinorum* in the sample plots were examined and measured to identify the current main zone of fuelwood collecting activities. Finally, participant observation with GPS elucidated the spatio-temporal pattern of collecting activities, and measurement of collected fuelwood illustrated different compositions of tree species for auto-consumption and charcoal-making for sale.

Informed by these findings and future investigation, special examination is necessary into how to create opportunities for institutionalising rules of spatio-temporal restriction on forest use by smallholders themselves and explore the potential for communal management of valuable resources, especially coppice regenerating species in the forest reserve.

Keywords: smallholder livelihood, participatory forest management, coppice regeneration, Kenya